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A Study on Nutritional Status of HIV Positive Children and Its Correlates in a Tertiary Health Care Institution of Kolkata

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ABSTRACT

Background: Nutritional status is vital to survival and wellbeing of children especially if they are HIV infected. In this context this study was attempted to assess nutritional status of HIV infected children of 0-14 yrs old.Also it aimed at finding out association,if any,between nutritional status of the children with socio-demographic and other factors.

Methodology: This cross-sectional study was conducted at Regional Pediatric ART centre, Medical College and Hospital, Kolkata. 202 HIV positive children of the above centre were study participants.Study duration was one year. Relevant information was collected by interviewing caregivers and taking anthropometric measurements.

Results: Among underfive children, underweight, wasted and stunted were 31.7%, 26.9% and 19.5% respectively. Among all the children 29.2% were thin and 10.4% were severely thin whereas 55% were stunted and 24.8% were severely stunted.There were differences among boys and girls regarding nutritional status, which were not statistically significant.The thinness of the children was positively associated with older age-groups (i.e. =>5 yrs), decrease of CD4% and the status of not taking ART whereas stunting was positively associated with older age-groups (ie =>5 yrs).

Conclusion: The findings of this study may be useful for similar settings and for policymakers for planning interventions.

Keywords: HIV/AIDS,HIV +ve children,nutritional status

INTRODUCTION

Nutritional status is vital to survival and wellbeing of children.Undernutrition has acute effects on morbidity and mortality as well as long term effects as poor cognitive and social development, productivity, economic growth,reduced human capital,and other health consequences.[1,2,3,4] Undernutrition is responsible for immune suppression,thus facilitates infections in children. Undernutrition in children is still widely prevalent globally— among under five children, 16% were underweight, 26% were stunted and 8% were wasted in 2011.[5]Majority of these undernourished children are from developing countries.[5,6]

On the other hand HIV/AIDS is making news in recent times.It is a pandemic nowadays. At the end of 2016 there were 36.7 million people living with HIV/ AIDS(PLHA);among them 2.1 million were children(<15 years).[7] In 2016 alone 1.8 million people were newly infected with HIV;among them children were estimated as .16 million.[7] In that year 1 million people died of AIDS alone; 1,20,000 i.e.8.3 % were children.[7,8] The disease has made its presence well felt in India as well.In 2015 there were 2.1 million PLHA in India;among them 6.5% were children(<15 years).[9] Thus a large number of children are suffering from HIV infection.

HIV infection and undernutrition play a vicious cycle.The disease manifestations in children are pronounced in many aspects, undernutrition is one of them.[10] Recurrent diarrhea with malabsorption and other opportunistic infections lead to failure to thrive in these children.[10] HIV/AIDS is associated with nutritional deficiencies in infected children.[11] On the other way, this undernutrition in children is responsible for accelerated disease progression,morbidity and reduced survival.[12] It was envisaged in MDGs(4 and 6) to reduce child mortality and combat HIV which was reaffirmed in the Sustainable Development Goals(2 and 3).[13,14] Addressing undernutrition in HIV infected children would be one important step to achieve the above goals.

Very few studies have been done on nutritional status of HIV positive children especially in India. In this context this study was attempted to assess nutritional status of the HIV infected children.Also it aimed at finding out association,if any,between nutritional status and the socio-demographic or other characteristics of the children.

METHODS

This was a institution based cross-sectional study.The study was conducted at Regional Pediatric ART centre, Medical College and Hospital, Kolkata. HIV positive children upto 14 years of age, who were treated at the above centre were considered for study.Study duration was one year (1st May 2013 – 30th April 2014).

The patients availed services here for six days a week.The centre was attended on any two days of week and all the eligible children were considered for the study.Thus during the one year period 283 children were attended for the study. Applying exclusion criteria, 71 children were excluded from the study **(**refused to give consent=20, from NGO/CBO =26, children diagnosed less than 2 months before the day of study =25)**.** At the end, 202 children were selected for this study.Relevant information was collected by interviewing the caregivers of the children with the help of a predesigned pre-tested semi-structured schedule, and anthropometric measurements such as weight, recumbent length (for children less than 24 months of age) and height (for children more than 24 monthsof age) were taken using the standard operating procedures.

Weight was measured to the nearest 0.1 kg in a standard weighing (bathroom) scale. Height was measured using stadiometer, to the nearest 0.1 cm. Recumbent length was measured by using an infantometer. Each measurement was done twice and the mean of the two readings was recorded.

The definitions used for the study were as follows:

Table 1: Distribution of study subjects according to socio-demographic and other characteristics. (n=202)

Characteristics	Children(%)
Gender	
Male	115(57.0)
Female	87(43.0)
Religion	
Hindu	155(76.7)
Muslim	47(23.3)
Age (yrs)	
<1	7(3.6)
1–5	34(16.8)
5–10	91(45)
10–14	70(34.6)
Primary caregivers	
Mother	124(64.6)
Father	36(18.8)
Close relatives	25(13.0)
Others	7(3.6)
Education level of primary caregivers	
Illiterate	60(31.3)
Below primary	17(8.9)
Primary completed	54(28.1)
Middle level	30(15.6)
Secondary level	21(10.9)
Higher secondary level	8(4.2)
Graduate or above	2(1)
PCI(Rs) Median (IQR) 625(400-1100)	
101-1000	142(74)
1001-2000	40(20.8)
2001-3000	7(3.6)
3001-4000	3(1.6)
HIV +ve members in the family	
Only mother	13(6.8)
Both parents	129(67.2)
Any parent and sibling	28(14.6)
Any of the above and extended family members	5(2.6)
Death in the family due to HIV infection	
Father only	43(22.4)
Mother only	20(10.0)
Both parents	7(3.6)
Any parent and sibling	7(3.6)
Only sibling	4(2.2)
Mode of transmission	
Mother to child	185(91.6)
Blood transfusion	12(5.9)
Probable unsafe injection/unknown	5(2.5)
Age at diagnosis(yrs)	
<1.5	22(10.8)
1.5–5	84(41.6)
5–9	66(32.7)
9–14	30(14.9)
Duration of disease	
2 m-2 yrs	103(51)
2yrs-4yrs	44(21.8)
4yrs-6yrs	30(14.9)
6yrs-8yrs	19(9.4)
>8yrs	6(3)
Mean(SD)	2.98(2.46)Yrs
Immunological status (CD4 Cell %)	
=>25(No suppression)	102(50.5)
15–24(Moderate Suppression)	69(34.2)
<15(Severe Suppression)	31(15.3)

NB: PCI=per capita income, IQR= inter quartile range, SD= standard deviation

a. Underweight is defined as weight for age Z-score (WAZ) of <−2. Severe underweight is considered if WAZ is <−3.
b. Wasting is defined as the weight for height Z-score (WHZ) of <−2. Severe wasting is considered if WHZ is <−3.
c. Stunting is defined as a height for age Z-score (HAZ) of <−2. Severe stunting is considered if HAZ is <−3.
d. Thinness (measure of body fat) is defined as a body mass index for Z-score (BMIZ) of <−2. Severe thinness was considered if BMIZ was <−3.

However for tabulation we followed WHO definitions i.e. <--2Z to –3Z scores were earmarked for nomenclatures- 'underweight', 'wasting' , 'stunting' and 'thinness'.

Ethical clearance: At the outset approval from Institutional Ethical Committee of Medical College & Hospital,Kolkata were sought for this study.Before inclusion in the study, voluntary informed consent was sought from the caregivers of the children at the centre.During this process the caregivers were explained about purpose of the study,right of the participants for adequate information,right to refuse to participate in the study and right to receive standard medical care available inspite of refusing to join the study.They were also ensured about anonymity and confidentiality of information .And there was no incentives for participating in the study.

Statistics: Anthropometric data was analyzed using WHO Anthro for personal computers, version 3.2.2, 2011 Software (for children aged 0-59 months) and WHO Anthro Plus version 1.0.4, 2007 Software (for children aged 5-14 years). Data was analysed using SPSS software (20 Version) and appropriate statistical tests(Chi Square test/ Fisher's Exact test**,** Logistic Regression) were done.

RESULTS

Among the study subjects boys outnumbered girls(57% vs 43 %);infants were 3.6%,underfives were 20.4 %.Majority of the primary caregivers were mothers(64.6%).Rest were close relatives namely grand-father,grand-mother,uncle,aunt or 'Others' i.e. step-mother, foster-mother, masi of Commercial sex workers(CSW) etc.There was high prevalence of illiteracy among caregivers(31.3%). Very few caregivers(1% only) had higher education ie graduation or above**.**Median PCI was Rs 625.And 67.2% of the children had HIV+ve both parents.22.4% children lost their father due to HIV.Mother-to-child-transmission was the most common mode of transmission(91.6%). **(Table 1)**

Among the under five children underweight, wasted and stunted were 31.7%, 26.9% and 19.5% respectively. However, prevalence of underweight and wasting was more among boys than girls (37.5% vs 23.5% and 29.2 %vs 23.5 % respectively) whereas for stunting it was reverse(25.0% for boys vs 41.1% for girls.Among all the children 29.2% were thin and 10.4% were severely thin whereas 55% were stunted and 24.8% were severely stunted.The difference in nutritional status between boys and girls were not statistically significant in both age-groups(0-5 yrs and 5-14yrs) by any anthropometric parameter.(by Chi Square test/Fisher's Exact test**).(Table 2)**

Table 2: Nutritional status of subjects according to various anthropometric indicators (WHO Z scores).*

Anthropometry parameters	0-5 years (n=41)			5-14 years (n=161)			Grand Total (n=202)
	Boys	Girls	Total	Boys	Girls	Total	
Weight for age							
Overweight(>2 Z)	1(4.2)	0	1(2.4)	-	-	-	
Normal(2 to -2 Z)	14(58.3)	13(76.5)	27(65.9)	-	-	-	
Underweight(<-2Z to -3Z)	5(20.9)	1(5.9)	6(14.6)	-	-	-	
Severely underweight (<-3Z)	4(16.7)	3(17.6)	7(17.1)	-	-	-	
Weight for height							
Overweight(>2 Z)	1(4.2)	1(5.9)	2(4.8)	-	-	-	
Normal(2 to -2 Z)	16(66.7)	12(70.6)	28(68.3)	-	-	-	
Wasted(<-2 Z to -3Z)	3(12.5)	4(23.5)	7(17.1)	-	-	-	
Severely wasted(<-3Z)	4(16.6)	0	4(9.8)	-	-	-	
Height for age							
Normal(2Z to -2 Z)	21(87.5)	12(70.6)	33(80.5)	49(53.8)	46(65.7)	95 (59)	128(63.4)
Stunted(<-2 Z to -3Z)	3(12.5)	5(29.4)	8(19.5)	29(31.9)	18(25.7)	47 (29.2)	55(27.2)
Severely stunted(<-3 Z)	0	0	0(0.0)	13(14.3)	6(8.6)	19 (11.8)	19(9.4)
BMI for age							
Normal(2Z to -2 Z)	17(70.8)	15(88.2)	32(78.0)	64(70.3)	47(67.1)	111 (68.9)	143(70.8)
Thin(<-2 Z to -3 Z)	3(12.5)	2(11.8)	5(12.2)	17(18.7)	16(22.8)	33 (20.5)	38(18.8)
Severely thin(<-3 Z)	4(16.7)	0	4(9.8)	10(11.0)	7(10.1)	17 (10.6)	21(10.4)

NB: BMI=body mass index; *The difference in nutritional status between boys and girls were not statistically significant in both age-groups (0-5 yrs and 5-14yrs) by any anthropometric parameter.(by Chi Square test/Fisher's Exact test).

Table 3: Covariates of undernutrition (BMI for Age and Height for Age) of the study subjects (n=202)

Covariates	Total	Thin (BMI for age <-2 Z)			Stunted(Height for Age <-2 Z)		
		Frequency (%)	OR(CI)	AOR(CI)	Frequency (%)	OR(CI)	AOR(CI)
Primary Caregivers							
Mothers	131	40(30.5)	1		75(57.3)	1	
Others	71	19(26.8)	0.83(0.44-1.58)	-	36(50.7)	0.77(0.43-1.37)	-
Education of primary caregivers							
Literate	137	40(29.2)	1		78(56.9)	1	
Illiterate	65	19(29.2)	1.0(0.52-1.92)	-	33(50.8)	0.78(0.43-1.41)	-
Age of the child(yrs)							
0-5	41	9(22)	1	1	13(31.7)	1	1
5-10	91	20(22)	1.0(0.41-2.44)	0.3(.12-.78)	54(59.3)	3.48(1.6-7.52)	0.15(.06-.39)
10-14	70	30(42.9)	2.67 (1.11-6.42)	0.28 (0.13-.6)	44(62.9)	4.03(1.8-9.2)	0.73(.38-1.43)
Sex							
Male	115	34(29.6)	1		64(55.7)	1	
Female	87	25(28.7)	0.96 (0.52-1.77)	-	47(54)	0.94(.53-1.64)	-
Religion							
Muslim	47	13(27.7)	1		25(53.2)	1	
Hindu	155	46(29.7)	1.1 (0.53-2.28)		86(55.5)	1.1(.57-2.11)	-
On ART?							
Yes	96	19(19.8)	1	1	NA		
No	106	40(37.7)	2.46 (1.3-4.65)	3.6(1.76-7.37)			
CD4 (%)							
=>25	96	22(22.9)	1	1	51(53.1)	1	
15-24	69	21(30.4)	1.47 (.73-2.96)	0.26(.1-.65)	35(50.7)	0.9(.49-1.69)	-
<15	37	16(43.2)	2.56 (1.14-5.74)	0.33(.13-.86)	25(67.6)	1.84(.83-4.08)	-
PCI							
<=Median	103	29(28.2)	1		62(60.2)	1	
>Median	99	30(30.3)	1.1(.6-2.03)	-	49(49.5)	0.65(.37-1.13)	-
Duration of disease							
<=Median	112	30(26.8)	1		65(58)	1	1
>Median	90	29(32.2)	1.3(.71-2.39)	-	46(51.1)	0.76(.43-1.32)	0.4(.2-.78)
Mode of transmission							
Vertical	185	53(28.6)	1		99(53.5)	1	
Others	17	6(35.3)	1.36(.48-3.86)	-	12(70.6)	2.08(.7-6.15)	-
Death due to HIV/AIDS in family							
No	116	33(28.6)	1		62(53.4)	1	
Yes	86	26(30.2)	1.09(.59-2.01)	-	49(57)	1.15(.66-2.02)	-

NB: OR= odds ratio, AOR= adjusted odds ratio, CI= confidence interval, ART= antiretroviral therapy

By regression analysis, thinness of the children was positively associated with older age-groups (i.e. =>5 yrs), decrease of CD4% and the status of not taking ART whereas stunting was positively associated with older age-groups(ie =>5 yrs**).(Table 3)**

DISCUSSION

In this study a moderate proportion of HIV positive children has been found undernourished.Among the under five children, underweight,wasted and stunted were 31.7%,26.9% and 19.5% respectively. These findings were comparable with NFHS-4 data of West Bengal for the same age-group(32.5% stunted,20.3% wasted and 31.5% underweight).[15] However, the findings differ from studies done elsewhere on HIV infected children.One study in South Africa found the prevalence of stunting as 29 % in the age group of 12-59 moths.[16] Another study in Tanzania, among the ART-treated HIV-positive children of 6-60 month old, 36.6% were stunted, 22.1% were underweight, and 13.6% were wasted.[17] One study in Gwalior, India the prevalence of wasting was 38.09%,of stunting was 76.19% while underweight was 71.42% among under five children, while in 6-18 years age group, the prevalence of underweight was 34.92% ,of stunting was 60.31% while low BMI for age(thinness) was 20.63%.[18] In another study from Hyderabad, among 1.5 yrs-15 yrs old children, 59.7% were stunted, 46.8% were underweight and 19.5% had low BMI for age(thinness).[19]

Undernutrition in boys and girls had differences in the current study, though the differences were not statistically significant in either age-groups(under-five and 5-14 yrs).Among the under five child-

ren,higher prevalence of underweight and wasting found in boys compared to girls(37.6% vs 23.5% and 29.1% vs 23.5% respectively) whereas for stunting it was reverse(12.5% vs 29.4%).However for older children(5-14 yrs), stunting was found more among boys(46.2% vs 34.3%) while thinness was slightly less among boys than girls(29.7% vs 32.9%).Another study from Hyderabad found boys (29.7%) to be more thin compared to girls (10%) and had significantly (P<0.05) lesser per cent body fat, but higher lean body mass than girls while underweight was comparable across all three age groups(1.5 yrs—15 yrs). [19]

As stated earlier,in this study, thinness of the children was positively associated with older age-groups (i.e. =>5 yrs), decrease of CD4% and the status of not taking ART whereas stunting was positively associated with older age-groups(ie =>5 yrs).The finding that ART helps to improve nutritional status of the children is supported by another study from Tanzania.[20]

One study among ART-treated HIV-positive children found factors (which were not dealt in the present study) like hunger, feeding frequency, and low birth weight associated with underweight status while diarrhea and feeding frequency associated with wasting .[17] The dissimilar results of various studies may be explained by differential factors like study settings,care and treatment received by the children e.g. the study subjects attending this tertiary centre get adequate attention and care,socio-economic status or other biological factors.

The study has some limitations.As stated above, it could not deal with some relevant factors for undernutrition.There was no comparison group in the study.We could not find out micronutrient deficiency in the study subjects.But the study has its strength in its large sample size covering study population from wide geographical area.So it reflects nutritional status and its correlates from sizeable portion of HIV infected children from this region, and the data may be useful for similar settings.

CONCLUSION

This study threw some light on nutritional status of HIV infected children and related factors for the same.A sizeable percentages of these children were found underweight,wasted and stunted.Chronicity of the disease in older age-groups, decrease of CD4% and the status of not taking ART were at risk for undernutrition.These findings might be reaffirmed by larger studies which in turn would help policymakers for interventions in these patients in India.

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